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ABSTRACT

Widespread use of interpretive research in studies of teaching and learning has highlighted a number of crucial ethical and legal issues. Although these issues have always been a concern for researchers, use of small samples and detailed analyses of teaching and learning have brought previously hidden aspects of teaching and learning into the public arena. As researchers endeavor to describe what happens in classes and probe to understand why these events occur, the beliefs, values and knowledge of teachers and students are inferred and used as a basis of grounded theory for teaching and learning. Inevitably, some of these findings are not favorable to the teachers and it is difficult or impossible to assure the anonymity of the participants. A variety of anticipated and unanticipated dilemmas are discussed, and ethical concerns are highlighted. (CW)

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Ethical Concerns and Research in Science Classrooms: Resolved and Unresolved Dilemmas

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Introduction

One of the things I learned early in my doctoral program at the University of Georgia was that an effective teacher educator always regarded his present classes as a sample for a larger population of intending teachers. In this way research was perceived as an essential component of effective teaching. An exemplary teacher carefully investigated courses as they were implemented in order to find out what worked and what needed to be changed when courses were next taught. Despite having learned this lesson, it was a long time before I actually applied what I had learned to my "main stream" research program on teaching and learning in elementary, middle, and high schools. My initial decade of conducting research in classrooms involved research on teaching rather than research with teachers. However, the final five years has seen an evolution from research on teachers to research with teachers because the substantive questions that needed answers necessitated an insider's view of life in classrooms, and several issues associated with the biases of researchers and teachers were making it difficult to share findings of classroom research with the public at large. This section describes a selection of studies in which I have been involved in an attempt to highlight the changing nature of questions and emerging concerns.

Research in Classrooms

My experience with research in classrooms began in 1974 with a study of teacher wait time (i.e., the duration of pauses between speakers in classroom interactions) in Western Australia (Tobin, 1980). Approximately 30 teachers began that study which was a quasi-experiment in which one group of teachers endeavored to use an extended wait time of more than three seconds during middle school science instruction while a control group maintained a more typical wait time of about a half a second. I recorded each lesson on audio tape but only measured the duration of the teachers' wait times. No other classroom process variables were measured and interactions with teachers were controlled so as to minimize experimenter effects. A variety of paper and pencil measures completed a standard quasi-experiment and enabled multivariate and univariate analyses to be conducted. Although audio tapes of the lessons taught contained an enormous range of rich data, no attempt was made to measure other variables and construct an explanatory system to link teacher variables such as wait time to other teacher variables, and to student process variables and student achievement.

Several years later I completed another study of teacher wait time (Tobin & Capie, 1982). On this occasion I was convinced of the need to relate the manner in which students engaged in class to attributes of students, achievement, and the behavior of teachers. The cognitive level of questioning, clarity, and other aspects of teacher behavior were measured and analyzed with the student data. Once again analyses of classroom interactions were minimal. However, at the end of this study a problem emerged. One of the teachers was annoyed when she learned that her class had been in the control group and had not performed as well as the experimental groups. As a conscientious teacher she did not regard the need to validate the strategy with a study of this type as sufficient reason for her students to be disadvantaged by approximately a standard deviation with respect to students receiving an extended teacher wait time. She was prepared to make adjustments in her own classroom on the basis of what made

sense to her; research support for particular teaching strategies was neither necessary nor sufficient.

A number of quantitative studies followed these initial wait time studies. But, after more than a decade of classroom research, the questions which interested me changed substantially. For example, I wondered what happened in science classes when teachers implemented their own curriculum. My research had shown me that teachers could facilitate student learning of high level cognitive outcomes when they used a long wait time and when they used a curriculum prescribed by me for the purposes of the research. Could I generalize the findings beyond the lessons I provided teachers? I thought so, but the question concerning what teachers did when they implemented their own curriculum was a good one and I decided to try to answer it.

A study which was implemented in 1984 broke new ground for me (Tobin & Gallagher, 1987). Primarily the study was ethnographic and for the first time I collected a team of researchers together to do the research. Despite the qualitative orientation, some aspects of the study clearly reflected my past approaches to research. Fifteen teachers from two high schools were involved in the study and, as well as observations and interviews, I used a battery of paper and pencil measures to obtain quantitative measures of locus of control, formal reasoning ability, student perceptions of the psychosocial learning environment, and science achievement. Soon I learned about the power of the methods employed in this study. The questions which emerged appeared to be more important than those which I had investigated for more than a decade and the answers had direct policy implications. I learned a lot about methods as well. Fifteen teachers were too many and the main value in doing team research was not to obtain consensus, but to obtain different perspectives on teaching and learning.

After the initial study which lasted for about a year, I refined the methods and the questions and conducted three other studies in mathematics and science employing much the same approach. Following a large study of exemplary practice in science and mathematics education (Tobin & Fraser, 1987), I decided to conduct a study which focused on the teaching of just one exemplary science teacher (Tobin, Espinet, Byrd & Adams, 1988). In this study a team of four researchers examined teaching and learning in all classes taught by the teacher over a period of about three months. As was the practice in prior studies we provided the teacher with our field notes on a daily basis. Thus, he could see what we were observing and would not feel threatened by the thought of all of the pages of writing. At regular intervals during the study, we provided the teacher with written reports, but we were careful not to sensitize him to our precise findings. At the conclusion of the study we provided the teacher with a complete report of the findings of the study. The teacher was furious!

In response to our 30-page double-spaced report, he provided a reply that was even longer. The report we had thought to be non-judgmental was perceived to be just the opposite. Our interpretations seemed to imply to him that he was an ineffective teacher and he questioned our right to make such judgments and inferences. The teacher highlighted a chasm which existed between the research team and the classroom practitioner. Even though our team contained members who had taught in schools as recently as the previous year, he associated their ideas with the ivory tower. The teacher felt that we were not being realistic or practical, and that we were

not facing the realities of life in classrooms. Our theoretical ideas about how students learn had no place in the life of this teacher, who felt the impact of forces requiring him to prepare students for college, cover the content in the text, cater to the demands of statewide tests and minimum standards, and meet the expectations of parents and administrators. The two opposing frameworks could not be reconciled and we decided to incorporate both the teacher's views and those of the research team in the paper. The teacher agreed that the paper was fair, but would not give ground on any of the points of disagreement. At the same time we acknowledged that the paper was fair, but did not agree with the teacher's perspectives. We could appreciate the rationality of the teacher's arguments, but disagreed with his basic premises. More than any other study, this one caused me to reflect on the design of studies of teaching and learning. I resolved to avoid such trauma in future research by keeping the teacher fully informed of our interpretations throughout the study.

It was too late to change the design of two peer coaching studies being conducted in Georgia at the same time as the study described above (Tobin & Espinet, in press a,b). One study involved a mathematics department of five and the other involved two science teachers. I was firm in my resolve to share all findings with the teachers even though it soon became apparent that each teacher was confronted by major problems. Our research teams met frequently and every research member was extremely nervous about sharing our interpretations with the teachers. Field notes were all right, they reasoned, but the interpretations were unnecessary and could do more harm than good. I insisted that the interpretations and the field notes would be shared with teachers. Frequent discussions with teachers about the results, allowing teachers to select the issues on which we would focus, and a non-judgmental stance on all issues gave me confidence to expect that the teachers would accept the report and welcome the extensive feedback on their teaching. Once again I was wrong. The teachers found criticism in every detail of feedback. One teacher explained how she decided to resign immediately. Then she "went for a walk in the woods, kicked a few stones, and decided to look into the mirror" to which we had led her. She did not resign and subsequently made a commitment to improve her classroom management.

The second peer coaching study also had some traumatic moments. One teacher, Jonathon, was teaching out of field and had major weaknesses in content knowledge, pedagogical knowledge, and discipline specific pedagogical knowledge. Providing him with feedback on a daily basis was extremely difficult. The learning environment was so dysfunctional in every class which he taught that it was almost impossible to find anything positive to say about any of the lessons. Jonathon tried to be successful and did his best to diagnose his major weaknesses. However, the problems were too great and very few improvements were noted during the six months when the study was in progress. Needless to say, the regular debriefing sessions were tense and filled with a sense of deja vu.

A study in Australia in 1986 (Tobin, Kahle & Fraser, in press) involved a relatively large research team consisting of experienced researchers. From the beginning we discussed ethical issues within the team and with the teachers. We agreed to keep teachers fully informed about the findings of the study and regularly provide them with comprehensive written feedback. Once again the team became very close to the teachers and cordial and

friendly relations were maintained with both teachers until the end of the classroom observations. One teacher, Sandra, was a little disappointed when she received the final report on the study. However, she soon overcame her disappointment and agreed there were some aspects of her teaching that she would like to improve. Peter's reactions were very different. He refused to accept data that indicated that student perceptions of personalization were unfavorable in his class. He questioned the validity of the questionnaire and dismissed the findings as not relevant. When he received the final report, he refused to read it and did not communicate further with the research team. In this instance Peter's class had strong gender differences which were attributed to the way in which he taught science. Peter chose to avoid the issue of change by refusing to acknowledge the validity of findings presented to him by the research team. Of course he might have been right, but he was not prepared to explain why he did what he did.

The salient point I failed to recognize is that neither observations nor interpretations are objective. When a research team visits classrooms there are too many things happening to record even the major proportion of events. What is noted and subsequently recorded is dependent on the focus of the research and on the beliefs, knowledge and values (i.e., the mind frames) of research team members. To the extent that teachers and researchers have different foci and different mind frames, disagreement can be anticipated in terms of the relevance and representativeness of what is recorded in field notes. When these same data are interpreted, the discrepancies can be expected to be even greater. Despite this failure to recognize the importance of mind frames in observing and interpreting the world, we learned a lot from these qualitative studies of classrooms. Furthermore, in all cases, the knowledge derived from the studies could be used in teacher enhancement programs almost immediately. But I felt very uneasy about the costs and the ethics associated with the type of research in which I had become involved. Changes were needed.

It is quite possible that teachers such as those who had difficulties when receiving the findings of the studies described so far in this paper would have had problems in any study. At this stage I was ready for a different design. Several factors prompted this decision. The first and most obvious was a concern for the issues associated with providing volunteer teachers with bad news. The second was that the questions which the studies were seeking to answer changed significantly in the four years of qualitative research. Such questions really needed the teacher to be a part of the research team.

In order to appreciate the changing nature of the questions addressed in my studies the following questions are presented as typical of those amenable to the designs employed.

1. What happens in science classes?

2. Why does it happen that way?

3. What would the teacher like to do?

4. Why can't the teacher do what (s)he wants to do?

5. How can we help the teacher to change?

6. Were changes implemented as intended?

My early qualitative studies focused on questions similar to 1 and 2 above. However, when we became more interested in changing teacher behavior, questions like 3, 4 and 5 became important. These questions can be answered with designs which include the teacher-as-researcher. Interestingly, it is not possible to obtain answers to question 1 with the teacher as a member of the research team. Numerous changes occur daily as the teacher plans, collects, interprets, and evaluates continuously. Such designs enable the change process to be investigated and documented.

Collaborative Research with Teachers

Collaborative research with teachers involves a number of assumptions. First, and most important, the design assumes that teachers have extensive practical knowledge which may or may not be available in verbal form. This knowledge enables teachers to contribute in a unique manner in meetings of the research team. One important role of other team members is to assist teachers to verbalize relevant professional knowledge, thereby making a contribution to the research agenda. Second, teachers can contribute unique perspectives to teaching and learning. Third, information received by the teacher is likely to be used to change what happens in the classroom as soon as possible after receiving the information. Consequently, teaching practices are expected to be constantly changing and associated learning environments will change as well. Clearly these assumptions should deter any researcher from wanting to find answers to questions like number 1 in the list above and should encourage researchers interested in understanding the process of change.

The design of studies in which the teacher is a researcher can involve the teacher in planning, data collecting, data analysis, interpretation, and reporting findings. The ethical questions seem to vanish. Not only is the teacher involved in identifying the problem to be researched, (s)he is also involved in designing data collecting strategies and interpreting the data that are collected. Finally, the teacher is involved in deciding what gets reported and how it will be written up. As a coauthor the teacher is always considered to be equal but different.

Problems associated with teachers having difficulties in their classroom do not vanish simply because the teacher is now a researcher. Teachers do have problems and they do not always frame them in the same way as colleagues on the research team. This can be a source of conflict and is an issue that needs considerable thought. When a researcher identifies a problem in a class it is usually someone else's problem. The teacher-researcher, who may not have perceived the problem in the first place, suddenly is confronted with an issue for which (s)he has no ownership and about which others expect him or her to make changes. Even when there is agreement that specific changes need to be made, there might be disagreement with respect to whether or not changes are occurring in the desired direction. Alternative mind frames can lead to very different perspectives on what is happening, to the data that get collected, and to the framing of questions.

Research with teachers as members of the research team is demanding and even wearing. Such designs can be valuable because we can learn a great deal from studies designed this way. However, if the research team is to be productive, there needs to be a great deal of respect and trust between members of the team. Attempts must be made to understand the points of view of all members of the research team and, to the extent possible, retain individual perspectives in the design, collection, interpretation, and reporting phases of the study. When we probe the nature of change, we are exploring the cognitions of teachers. Special sensitivity needs to be extended to the teacher-researcher. When we examine the knowledge, beliefs, and values of a teacher-researcher, we are intruding into some very private areas of the mind. When teacher-researchers realize that they have problems that need to be addressed, there can be some awkward moments. Illustrative examples of these important points are provided below based on a study of high school science involving a teacher-researcher called Sarah, a graduate student, and myself (Tobin & Ulerick, 1989).

On the face of it Sarah should have been an effective science teacher. She had a strong background in science education and had been a successful teacher at college level. Yet things did not work out as planned. The school environment was such that any new teacher was bound to be tested by the students. Sarah taught two classes a day, a physical science class and an earth science class. Each lesson was observed and the research team met several times a week to collect, analyze, and interpret data. Sarah experienced significant difficulties in coping with her two classes in the fall semester. The students tested her out and soon found she was unable to cope. Over a short period of time the students became unmanageable. Consequently, Sarah was unable and unwilling to focus on enhancing student learning. Instead she endeavored to survive. The students were nearly all unpleasant to her and she reciprocated.

When the study commenced in the spring semester, a pattern of severe management problems was well established. Our research question at the beginning of the study was: "Why can't Sarah do what she wants to do?" Initially, the principal data source was Sarah. Because of my prior knowledge and interests, I was eager to see how Sarah's knowledge, beliefs, metaphors, and values were associated with the problems which she was experiencing.

Team meetings for the researchers were unhappy affairs. As we endeavored to find a reason for Sarah's lack of success in the classroom by probing her values, beliefs, and knowledge, we related what we observed in the classroom to what Sarah said she believed. The environment in the team meetings was not unlike that experienced with Jonathon in the peer coaching study described earlier. On many occasions there were long silences and it was frequently difficult to discuss what was happening because few things were working out as planned and the teacher-researcher was under a great deal of stress at team meetings.

Interviews were difficult to conduct. The open-ended approach identified an issue by posing a problem and then left Sarah to structure her response as she wished. My strategy was to ask her to relate what she believed (or said she believed) to what was happening or perceived to be happening in class. Early in the study it became apparent that Sarah was emotionally torn by the fact that she was doing things in class that were

not consistent with her beliefs.

Sarah perceived three roles to be of significance in her classroom. She described her roles in terms of facilitating learning, managing students, and assessing students. Not surprisingly, most value was associated with management. An interesting finding was that there were conflicts when beliefs within one role were compared with beliefs associated with other roles. It appeared that the understandings which Sarah had of her roles as a teacher were such that she could not fulfill all her roles in the way she believed she should.

Sarah was very open to suggestions to improve her teaching. We decided that strong measures were needed to reset the management system. After many hours of discussion about rules, expectations, and enforcement of rules, Sarah and her Head of Department implemented the course of action we had formulated.

Dramatic improvements occurred overnight. Instead of having to focus on management, Sarah could attend to her role as facilitator of learning. Over a period of several weeks she was able to introduce group work, hands-on activities, use concept maps, and generally engage students in an active manner. Despite the apparent calm in the room, our observations revealed a latent hostility in several of the students in each room. There were further problems that needed to be resolved. The students did not seem to like their teacher. And Sarah noted that they had not yet given her "the right to teach them." At that time we noted that Sarah conceptualized her role as an evaluator of students in terms of rewards and punishments. This appeared to be the root cause for many of the problems we were observing. We suggested to Sarah that she think of assessment in terms of a mirror for the students' minds. Sarah knew that she needed help and readily agreed to re-think assessment. The next day a series of changes were introduced into the class and almost immediately there were signs of improvement. The students started to cooperate with Sarah and for the first time she could focus on her role as a facilitator of learning.

Having Sarah on the research team was extremely beneficial. She gave us data that could not reasonably be obtained from a teacher who was not fully involved in the study as a trusted colleague. For example, Sarah compiled two drafts of a 10-page typed written summary of her beliefs associated with assessment. These data took a considerable amount of time to put together and subsequent discussions about the data were grueling. There is no doubt that we learned things we could not have learned with any other design.

My decision to plan and implement studies involving teachers-as-researchers stemmed from two discrete trends. First, the ethical issues involved in doing research <u>on</u> teachers were looming large. From an ethical standpoint research <u>with</u> teachers clearly was preferable. The second reason for opting for studies involving teacher-researchers was to gain better access to teacher cognitions, particularly metaphors used to conceptualize roles, beliefs, and knowledge. Active involvement of teachers in planning and implementing a study could provide better data and provide insights into factors associated with teacher change.

Ethical Concerns

Why do teachers do what they do in classrooms? In the first place most of the teachers we have worked with have prided themselves on the fact that they were professionals who worked hard. In most cases the self-esteem of teachers seemed to be associated with their success in their chosen profession. They were concerned for the performance of their students and allocated many of their out-of-school hours to planning, assessing and doing other things associated with the school. In the case of science teachers, a lack of laboratory assistants placed a burden on them to prepare equipment and materials for laboratories. Teachers have autonomy and can define their own roles as a teacher to a large extent. Although most teachers are facilitators of learning, curriculum designers, managers, and assessors, each teacher can choose to give weight to one or more of these roles and add additonal roles. Our studies suggest that teachers who take pride in their profession have defined their roles in a way that enables them to be successful. They take pride on the positive feedback they receive and because of the extent of the positive reinforcement, they often focus most of their available energy and time on "system maintenance." Little thought seems to be given to changing what is being done in a major way.

The emphasis given to the roles undertaken by a teacher depends on the manner in which the teacher has conceptualized the roles, beliefs associated with the roles, and the value associated with each role. Of course contextual factors also come into effect. The constraints the teacher sees applying in the particualr environment usually are considered as the teacher frames problems to be solved and plans a course of action. Thus, to raise questions about what a teacher does in the classroom is to raise questions that reflect on the teacher's beliefs, values and role conceptualizations. Importantly, to raise such questions might induce reflection on the teacher's self worth and professionalism. In such circumstances questions ought not be raised without considerable thought, and sensitivity to the feelings and needs of the teacher. An important consideration is the teachers preparedness to cope with questions that might result in a lowering of self-esteem.

When a researcher or team of researchers choose to focus on a particular role of the teacher and to ignore others there is a potential problem if the teacher has given low priority to the role on which the research is focussed. For example, in several of the studies we undertook in our five year research program of interpretive research (1984-89) it was evident that the teacher's were emphasizing rote learning of facts about science and mathematics. Even when laboratory activities were advocated the teachers emphasizied memorization of specific content from laboratory activities. The main reason for this emphasis was associated either with beliefs held by teachers about the nature of science and mathematics or on perceived constraints from the state, university, and school district. Thus to provide teachers with a description of teaching, which emphasizes something they did not attach great value to in particular circumstances, is to invite a negative reaction from them, or at the very least, a difference of opinion.

Researchers bring with them to the classroom their own framework of role conceptualizations: beliefs, values, and a perception of the constraints under which teachers operate and how these might be dealt with. Differences

between teacher and researcher perceptions might be even greater if the researchers are giving value to learner outcomes such as learning high level cognitive outcomes and teachers are emphasizing rote learning of facts and how to use procedures to get correct answers. Consequently, the climate is right for making judgments about the worth of what is happening and why it is happening. Is it appropriate to make judgments about a teacher undertaking his/her professional activities during a study?

Judgments are inevitable. To choose to describe one set of events and to ignore another is a judgment. To highlight specific actions in a discussion with a teacher but to avoid discussing others also is a judgment. Thus, to discuss teaching with a teacher involves many judgments. If we choose to speak to teachers the issue cannot be whether or not judgments are to be made. Judgments will be made in the course of conversations.

From our studies with Sarah we learned a great deal about ethical concerns. We began the study with the somewhat naive view that judgments would be minimized in the study. Yet this was to be a study of change. A study involving reflection in and on action. By its very nature the study was set up to be judgmental. Then who was to make the judgments? Ideally Sarah should be the one to judge and make decisions. However, if that was the course of action chosen the changes that were needed would never have occurred. Sarah needed help. Someone to focus her reflections was needed and that person had to make judgments. To be involved in reflection sessions with Sarah necessitated listening in a sensitive manner. Much of what she said would not be commented upon, but some of her explanation revealed beliefs and metaphors that were salient to the manner in which she conceptualized teaching and implemented the curriculum. These selected explanations became the focus for questions and further discussion. At times it was necessary to probe and to make Sarah uncomfortable as conflicting beliefs were juxtaposed to enable her to reflect on what she believed. The process was stressful as Sarah came to realize that some of her long-held beliefs that had driven her actions in the classroom could no longer be regarded as true. As was the intent of the study, the reflection process that occurred resulted in change, and at times the discussions were painful and traumatic for all members of the research team. At times we were conscious of the judgments that were made during team meetings and at other times we were not.

The important concepts that emerged with respect to the judgments made during team meetings concerned trust, sensitivity to one another's feelings, and mutual respect in and out of team meetings. A high level of trust was built up between Sarah and myself during the study. And during the questions and explanations that occurred during team meetings I was very sensitive to Sarah's level of comfort. I was conscious of the need to back off at times during an explanation or when asking questions. When team meetings focused on change I tried to allow Sarah to say most and to confine the length of any of my own explanations. I had a sense of what Sarah could accomplish and we shared a vision of the magnitude of the changes that needed to occur in her classroom and the time scale on which the changes would occur.

Those who conduct research on teaching and learning are endeavoring to build a framework for teachers, teacher educators, policy makers, and researchers to improve the quality of education. In their efforts to

construct a better educational system there are times when researchers will infringe the rights of the subjects who have participated in studies. The incidence of such occasions can be minimized by undertaking research with teachers rather than conducting research on teachers. Even so, a number of cautions need to be exercised. The following list of criteria are provided as examples of the cautions that research groups might exercise when undertaking research on learning and teaching.

1. Unless teachers have agreed to be referred to by their actual name always use pseudonyms for the school and teachers involved in research.

2. To the extent possible, involve teachers in discussions of the data as they are collected, as research questions are formulated and pursued and as interpretations are made.

3. If the purpose of the research allows, ensure that the teacher knows what research questions are being investigated.

4. Do not speak publicly about the research in a manner that denigrates the teaching profession or schools.

5. Demonstrate concern for teachers when providing them with feedback on teaching or learning, and when questions are selected and posed to focus reflection. On occasions the greater good is done by not providing feedback and by avoiding specific questions that might be judged to be highly relevant to constructing an understanding of phenomena.

6. Consistent with the concerns above, allow teachers to read any articles or interpretive papers prepared from a study.

As desirable as adoption of these criteria might be, only one of them concerns an ethical issue. Unless participants in a study can be guaranteed anonymity nothing should be published or presented at a meeting or colloquium without written consent of the participants.

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